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Indian Standard
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PART 66 SPACE RADIO COMMUNICATION

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MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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Gr 2 *July* 1988

Indian Standard

ELECTROTECHNICAL VOCABULARY

PART 66 SPACE RADIO COMMUNICATION

0. FOREWORD

0.1 This Indian Standard (Part 66) was adopted by the Bureau of Indian Standards on 23 February 1988, after the draft finalized by the Basic Standards on Electronics and Telecommunication in consultation with the Radio Communications Sectional Committee had been approved by the Electronics and Telecommunication Divisional Council.

0.2 A series of Indian Standards has been prepared with a view to bringing together, the terms relating to radio communication covering different aspects, such as radiowave propagation, sound and television broadcasting, radio telegraphy and mobile radio, etc.

0.2.1 This standard covers technical terms relating to space radio-communication including the terms of administrative nature.

0.3 This standard is based on IEC Pub 50(725) 'Advance edition of International Electrotechnical Vocabulary, Chapter 725 : Space radiocommunications', issued by the International Electrotechnical Commission (IEC).

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1. SCOPE

1.1 This standard (Part 66) covers terms and definitions relating to space radio communication.

2. TERMINOLOGY

2.1 Satellites and Orbits

2.1.1 *Spacecraft* — A man-made vehicle which is intended to go beyond the major part of the Earth's atmosphere.

2.1.2 *Deep Space* — Space at distances from the Earth greater than or approximately equal to the distance between the Earth and the Moon.

2.1.3 *Space Probe* — A spacecraft designed for making observations or measurements in space.

2.1.4 *Deep Space Probe* — Space probe inteded to go into deep space.

2.1.5 *Satellite* — A body which revolves around another body of preponderant mass and which has a motion primarily and permanently determined by the force of attraction of that other body.

Note — A body so defined which revolves around the Sun is called a planet or planetoid.

2.1.6 *Primary Body (in relation to a Satellite)* — The attracting body which primarily determines the motion of a satellite.

2.1.7 *Orbit* — The path, relative to a specified frame of reference, described by the centre of mass of a satellite or other object in space subjected primarily to natural forces, mainly the force of gravity.

2.1.8 *Unperturbed Orbit (of a Satellite)* — The orbit of a satellite in the idealized condition in which the satellite is subjected only to the attraction of the primary body, effectively concentrated at its centre of mass.

Note — In a frame of reference whose centre is the centre of mass of the primary body, and whose axes have fixed directions in relation to the stars, the unperturbed orbit is a conic section.

2.1.9 *Orbital Elements* — The parameters by which the shape, dimensions and position of the orbit of a body in space can be defined in relation to a specified frame of reference.

Note 1 — The position of the centre of mass of the body in the orbit at a spacified time is required as well as the orbital elements in order to determine the position of the body at any time.

Note 2 — The frame of reference used is a direct rectangular co-ordinate system $OXYZ$, in which the origin is at the centre of mass of the primary body and the third axis OZ is perpendicular to the principal reference plane, also called the basic reference plane, or simply the reference plane.

Note 3 — For an artificial earth satellite, the principal reference plane is the Earth's equatorial plane and the third axis OZ has a south to north orientation.

2.1.10 *Orbital Plane (of a Satellite)* — The plane containing the centre of mass of the primary body and the velocity vector of a satellite, the frame of reference being that specified for defining the orbital elements.

2.1.11 *Ascending (Descending) Node (of a Satellite)* — The point at which the orbit of a satellite intersects the principal reference plane, the third co-ordinate of the satellite being increasing (decreasing) on passing through that point.

2.1.12 *Direct (Retrograde) Orbit (of a Satellite)* — A satellite orbit such that the projection of the centre of mass of the satellite on to the principal reference plane revolves about the axis of the primary body in the same direction as (reverse direction to) that in which the primary body rotates.

2.1.13 *Inclination (of a Satellite Orbit)* — The angle between the orbital plane of a satellite and the principal reference plane.

NOTE — By convention, the inclination of a direct orbit is an actue angle and the inclination of a retrograde orbit is an abtuse angle.

2.1.14 *Circular Orbit (of a Satellite)* — A satellite orbit in which the distance between the centres of mass of the satellite and the primary body is constant.

2.1.15 *Elliptical Orbit (of a Satellite)* — A satellite orbit in which the distance between the centres of mass of the satellite and the primary body is not constant, but remains finite.

NOTE — In this case, the unperturbed orbit is an ellipse in a frame of reference whose centre is the centre of mass of the primary body and whose axes have fixed directions in relation to the stars.

2.1.16 *Equatorial Orbit (of a Satellite)* — A satellite orbit, the plane of which coincides with that of the equator of the primary body.

2.1.17 *Polar Orbit (of a Satellite)* — A satellite orbit, the plane of which contains the polar axis of the primary body.

2.1.18 *Inclined Orbit (of a Satellite)* — A satellite orbit which is neither equatorial nor polar.

2.1.19 *Apoapsis (Apofocus)* — The point in the orbit of a satellite or planet which is at a maximum distance from the centre of mass of the primary body.

2.1.20 *Periapsis (Perifocus)* — The point in the orbit of a satellite or planet which is at a minimum distance from the centre of mass of the primary body.

2.1.21 *Apogee* — The point in the orbit of an earth satellite which is at a maximum distance from the centre of the Earth.

NOTE — The apogee is the apoapsis of an earth satellite.

2.1.22 *Perigee* — The point in the orbit of an earth satellite which is at a minimum distance from the centre of the Earth.

NOTE — The perigee is the periapsis of an earth satellite.

2.1.23 *Altitude of the Apogee (Perigee)* — The altitude of the apogee (perigee) above a specified reference surface serving to represent the surface of the Earth.

2.1.24 *Period of Revolution (of a Satellite) [Orbital Period (of a Satellite)]* — The time elapsing between two consecutive passages of a satellite through a characteristic point on its orbit.

NOTE — In the absence of further information, it shall be understood that the period of revolution is the enomalistic period (*see also* **2.1.26** and **2.1.27**).

2.1.25 *Anomalistic Period* — The time elapsing between two successive passages of a satellite through its periapsis.

2.1.26 *Nodal Period* — The time elapsing between two consecutive prssages of a satellite through the ascending node of its orbit.

2.1.27 *Sidereal Period of Revolution (of a Satellite)* — The time elapsing between two consecutive intersections of the projection of a satellite on to a reference plane which passes through the centre of mass of the primary body with a line in that plane extending from the centre of mass to infinity, the normal to the reference plane and the direction of the line both being fixed in relation to the stars.

2.1.28 *Sidereal Period of Rotation (of an Object in Space)* — Period of rotation around its own centre of mass of an object in space in a frame of reference fixed in relation to the stars.

2.1.29 *Station-Keeping Satellite* — A satellite, the position of the centre of mass of which is controlled to follow a specified law, either in relation to the positions of other satellites belonging to the same space system or in relation to a point on Earth which is fixed or moves in a specified way.

2.1.30 *Synchronized Satellite [Phased Satellite (Deprecated)]* — A satellite controlled so as to have an anomalistic period or a nodal period equal to that of another satellite or planet, or to the period of a given phenomenon, and to pass a characteristic point in its orbit at specified instants.

2.1.31 *Synchronous Satellite* — A satellite for which the mean sidereal period of revolution is equal to the sidereal period of rotation of the primary body; by extension, a satellite for which the mean sidereal period of revolution is approximately equal to the sidereal period of rotation, of the primary body.

2.1.32 *Geosynchronous Satellite* — A synchronous satellite of the Earth.

NOTE — The sidereal period of rotation of the Earth is about 23 hours 56 minutes.

2.1.33 *Stationary Satellite* — A satellite which remains fixed in relation to the surface of the primary body; by extension, a satellite which remains approximately fixed relative to the surface of the primary body.

NOTE — A stationary satellite is a synohronous satellite with an equatorial, circular and direct orbit.

2.1.34 *Geostationary Satellite* — A stationary satellite having the Earth as its primary body.

2.1.35 *Geostationary Satellite Orbit* [*Geostationary Orbit (Deprecated term)*] — The unique orbit of all geostationary satellite.

2.1.36 *Attitude-Stabilized Satellite* — A sattellite with at least one axis maintained in a specified direction, for example, towards the centre of the Earh, the Sun or a specified point in space.

2.2 Space Radiocommunication Systems

2.2.1 *Space Station* — A radio station located on an object which is beyond, is intended to go beyond, or has been beyond, the major protion of the Earth's atmosphere.

NOTE — (Radio) station : One or more transmitters or receivers, or a combination of transmitters and receivers, including auxiliary equipment, necessary at one location for carrying on a radiocommunication service.

2.2.2 *Earth Station* — A radio station located either on the Earth's surface or within the major portion of the Earth's atmosphere intended for communication:

a) with one or more space stations, or

b) with one or more stations of the same kind by means of one or more reflecting satellites or other subjects in space.

NOTE — An earth station located on board a ship (an aircraft) is called a 'ship earth station' ('aircraft earth station').

2.2.3 *Space Radiocommunication* — Any radiocommunication involving the use of one or more space stations or the use of one or more reflecting satellites or other objects in space.

NOTE 1 — Communication between two places on Earth by means of space radiocommunication is often called 'satellite communication'.

NOTE 2 — Any radiocommunication other than space radiocommunication or radioastronomy is called 'terrestrial radiocommunication' and a station effecting terrestrial radiocommunication is a 'terrestrial station'.

2.2.4 *Active Satelltie* — A satellite carrying a space station.

2.2.5 *Reflecting Satellite* — A satellite intended to reflect radiocommunication signals.

2.2.6 *Space System* — Any combination of earth stations, space stations and exceptionally reflecting satellites cooperating to provide space radiocommunications for specific purposes.

2.2.7 *Satellite System* — A space system using one or more artificial earth satellites.

2.2.8 *Satellite Network* — A combination of one satellite and all of its associated earth stations.

2.2.9 *Satellite Link* — A link between a transmitting earth station and a receiving earth station through one satellite.

NOTE — A satellite link comprises one up-link and one down-link.

2.2.10 *Multi-Satellite Link* — A link between a transmitting earth station and a receiving earth station through two or more satellites, without any intermediate earth station.

NOTE 1 — A multi-satellite link comprises one up-link, one or more satellite-to-satellite links and one down-link.

NOTE 2 — A link consisting of two or more satellite links in tandem is called a 'multi-hop satellite link'.

2.2.11 *Footprint of a Beam* (*of a Satellite Antenna*) — The area on the surface of the Earth within which the antenna gain is greater than a specified value relative to its maximum gain.

2.2.12 *Satellite Broadcasting* — Broadcasting by means of a transmitter on board a satellite.

NOTE — Broadcasting : Radiocommunication in which the emissions are intended for direct reception by the general public.

2.2.13 *Individual Reception* (*in Satellite Broadcasting*) – The reception of emissions from a broadcasting satellite by simple receiving installations generally using an antenna of small dimensions, intended to serve a single dwelling.

2.2.14 *Community Reception* (*in Satellite Broadcasting*) — The reception of emissions from a broadcasting satellite by receiving installations which may be more complex and have an antenna larger than those used for individual reception, and are intended for a group of the general public, either at one location and with a small number of receivers, or through a distribution network covering a limited area.

NOTE — Satellite broadcasting with community reception must not be confused with the transmission by satellite of programmes to terrestrial broadcasting transmitters (which is called 'direct distribution by satellite').

2.2.15 *Satellite Radiodetermination* — Radiodetermination which makes use of a satellite system.

NOTE – Radiodetermination : The determination of position, or obtaining of information relative to position, by means of propagation properties of radiowaves.

2.2.16 *Satellite Redionavigation* — Satellite radiodetermination used for radionavigation.

NOTE — Radionavigation : Radiodetermination used for the purposes of navigation, including obstruction warning.

2.2.17 (*Space*) *Tracking* — Determination of the orbit velocity or instantaneous position of an object in space by means of radiodetermination for the purpose of following the movements of the object; by extension, any way of following the movements of an object in space.

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